

## Pathway to a Science, Technology, Engineering, and Mathematics (STEM) Degree: From Community College to Four-Year University

NSF Program: Research on Gender in Science and Engineering (GSE)

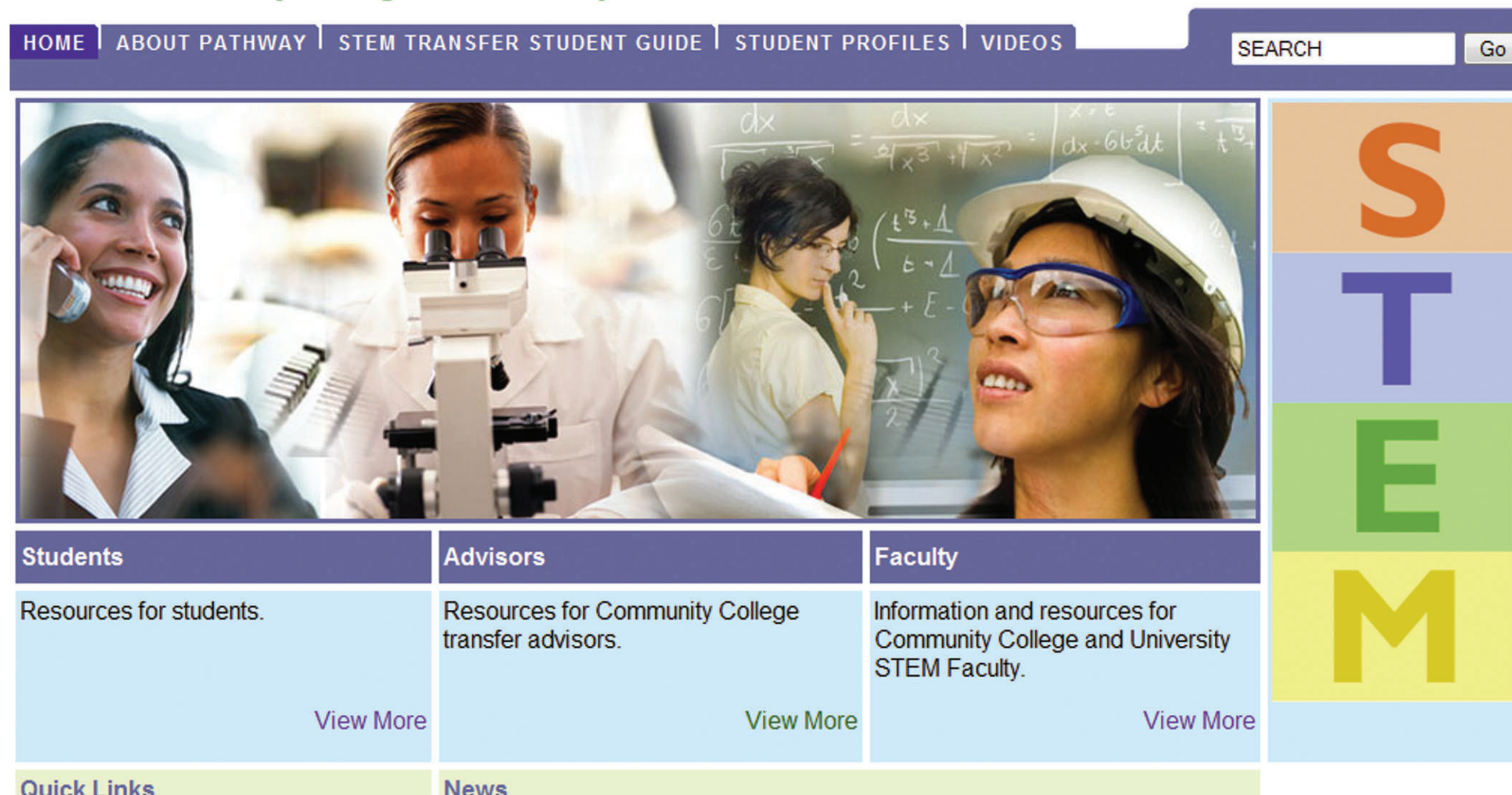
### OBJECTIVES

The objectives of this dissemination project are:

- to develop media presentations in the form of educational videos that educate the public and college students about the pathway to a STEM baccalaureate degree from two-year colleges;
- to develop a STEM Pathway: Transfer Student Guide (TSG) for prospective students attending two-year colleges that educates students about the transfer process; and
- to develop a web site that will be used to disseminate educational resources to educators (two- and four-year institutions), academic counselors/advisors, Transfer Center coordinators, students in two-year colleges, business and industry, researchers, policymakers, and the public

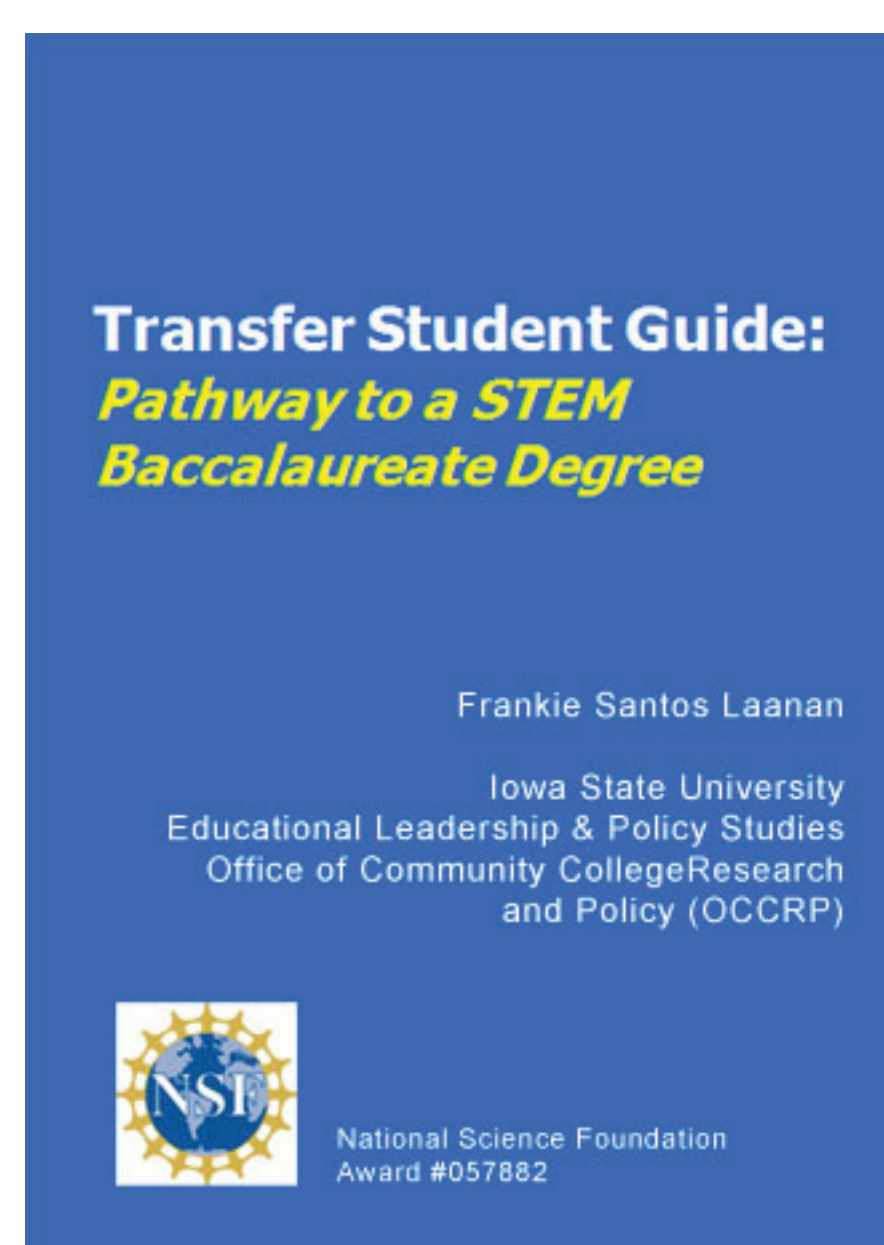
### Pathway to a Science, Technology, Engineering, Mathematics (STEM) Degree From Community College to University

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### TRANSFER STUDENT GUIDE (TSG)

- Resource for community college students who have transfer aspirations to the four-year college/university
- Content information will be based on the research literature and empirical data collected by the PI and Pathway Team
- Available and disseminated during New Student Orientations and College Success courses
- Available to instructors teaching in STEM areas in community colleges
- Other Community College Personnel:
  - Transfer Center directors, coordinators, advisors
  - Career and/or academic counselors
  - Student support services
  - Retention programs and services

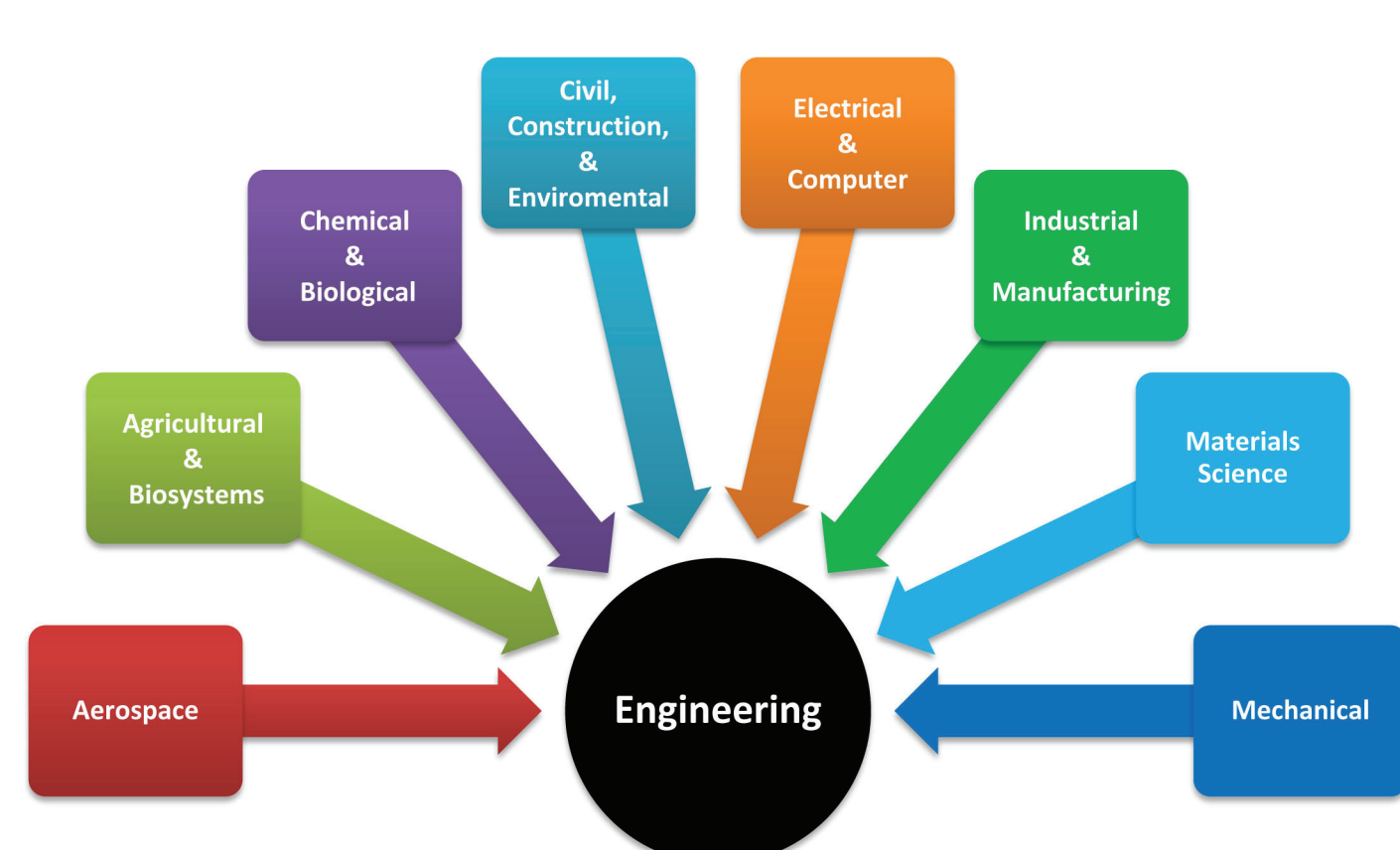
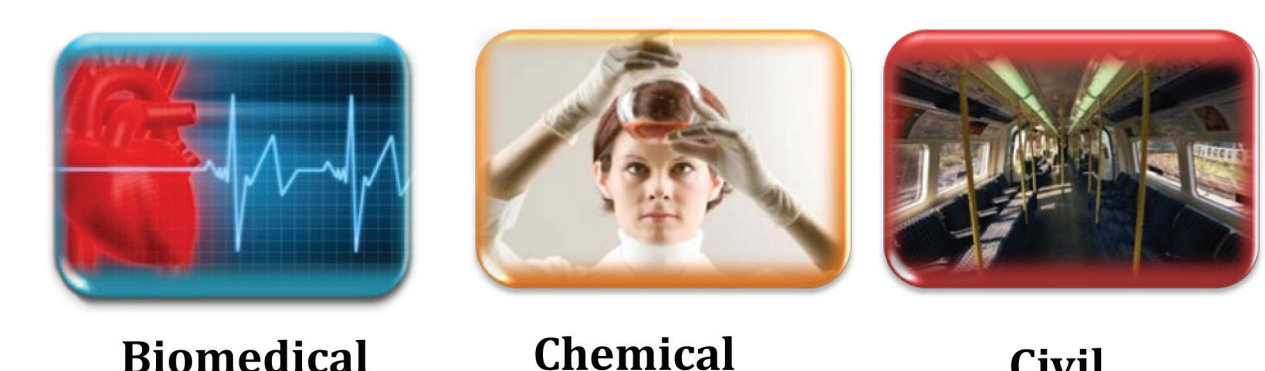


### EDUCATIONAL VIDEOS

- Pathway to a STEM Bachelor's Degree
  - What is STEM?
  - STEM Fields and Careers
  - STEM Statistics: Participation, Retention, and Graduate Rates of Women and Minorities in STEM fields
  - Pathway to the Baccalaureate: The Transfer Process
- Research on Gender and Ethnicity in Science and Engineering
  - Overview of Research
  - Impact of faculty and community college environment on women and minorities' STEM aspirations
- Recruiting and Retaining Women and Minorities in Pre-STEM Majors
  - Best Practices
  - Exemplary Programs and Practices
- Community College and University Partnerships
  - Navigating the Transfer Process
  - Preparing for a STEM Major
  - Best Practices and Exemplary Programs

### EXCERPTS FROM STEM TSG

#### Engineering Majors



#### Math Majors

Actuarial Science	Mathematics Education	Mathematics	Statistics
<ul style="list-style-type: none"> <li>Help businesses assess the risk of certain events occurring</li> <li>Formulate policies that minimize the cost of that risk</li> <li>Address financial questions</li> <li>Help design insurance policies, pension plans, and other financial strategies</li> <li>May major in a business related such as finance, economics, or business</li> </ul>	<ul style="list-style-type: none"> <li>Studies actuarial science, math, or statistics</li> <li>Participates in a elementary or secondary teaching licensure program</li> <li>Can be licensed during or after bachelor's degree attainment</li> <li>May pursue graduate education to teach in postsecondary sector</li> <li>Minimum degree requirement is B.S. or B.A.</li> </ul>	<ul style="list-style-type: none"> <li>Study both pure and applied math</li> <li>Degree recipients are found in almost every sector of the job market</li> <li>Use mathematical modeling and simulation to show physical phenomena</li> <li>Also reviews analysts, optimization, and control of processes</li> <li>Desired career path may require a M.S. or Ph.D.</li> </ul>	<ul style="list-style-type: none"> <li>Design surveys and experiments</li> <li>Collect, process, and analyze data</li> <li>Interpret results</li> <li>Determine the accuracy in products</li> <li>Evaluate effectiveness of business strategies</li> <li>Methods are used by many other disciplines</li> <li>Entry-level positions with B.S. degree in the federal government</li> </ul>

#### Physical Science Majors



### RESEARCH

Starobin, S. S., & Laanan, F. S. (2005). Influence of precollege experience on self-concept among community college students in science, mathematics, and engineering. *Journal of Women and Minorities in Science and Engineering*, 11, 209-229.

"The objective of this study is to understand the influence of students' background characteristics, high school academic performance, and attitude toward science on their self-concept. Specifically, this study addresses gender differences and the extent to which each construct influenced students' self-concept" (p. 214).

Starobin, S. S., & Laanan, F. S. (2008). Broadening female participation in science, technology, engineering, and mathematics: Experiences at community colleges. *New Directions for Community Colleges*, (142), 37-46.

"To achieve the objectives, the project investigators identified and then studied exemplary transfer programs that increase participation among female students in a preengineering program at a community college; provide students the opportunity to reflect on and share their academic and personal experiences; and identify factors that help female students transfer from a community college to a four-year university in engineering" (p. 39).

#### Tables \*

TABLE 1. 1999 and 2000 S&E bachelor's and master's degree recipients, by attendance at community college and field of highest degree: 2001

Degree field	All recipients	Attended		Did not attend	
		Number	Percent	Number	Percent
All degree fields	903,400	394,200	44	509,200	56
Computer and math sciences	115,000	47,900	42	67,100	58
Life and related sciences	172,300	78,900	46	93,400	54
Physical and related sciences	41,100	15,100	37	26,000	63
Social and related sciences	423,700	192,600	45	231,200	55
Engineering	151,200	59,800	40	91,400	61

NOTE: Details may not add to totals because of rounding.

SOURCE: National Science Foundation, Division of Science Resources Statistics, National Survey of Recent College Graduates: 2001.

TABLE 3. 1999 and 2000 S&E bachelor's and master's degree recipients who have attended community college by field of degree and whether they received an associate's degree: 2001

Degree field	All recipients	Received degree		Did not receive degree	
		Number	Percent	Number	Percent
All S&E degree fields	394,200	110,100	28	284,100	72
Computer and math sciences	47,900	18,300	38	29,600	62
Life and related sciences	78,900	15,400	20	63,400	80
Physical and related sciences	15,100	3,500	23	11,600	77
Social and related sciences	192,600	59,900	31	132,700	69
Engineering	59,800	13,000	22	46,800	78

NOTE: Details may not add to totals because of rounding.

SOURCE: National Science Foundation, Division of Science Resources Statistics, National Survey of Recent College Graduates: 2001.

\* Tsapogas, J. (2004, April). *The role of community colleges in the education of recent science and engineering graduates*. (No. NSF 04-315). Arlington, VA: National Science Foundation.

### STUDENT PROFILE HIGHLIGHT



**Name:** Katie Walquist  
**Major:** Physics  
**Hometown:** Ames, IA  
**Extracurricular Activities and Honors:** Phi Theta Kappa Member, Coca-Cola Scholarship Recipient, 2008, Distinguished Chapter Leader Award Recipient Phi Theta Kappa – Tau Phi October 2008, Boone Campus Nominee on the 2009 All-Iowa / All-USA Academic Team, 2009 Nominee Who's Who Among Students In American Universities and Colleges, Oncology Camp Volunteer, Schaller Jaycees volunteer, volunteer at The Help Center (a local food pantry), Parent volunteer for Ames Impact Track, active member of my church and church choir  
**Community College Attended:** Des Moines Area Community College

#### Why did you choose to transfer to Iowa State University?

Iowa State University has always interested me. Having an interest in science, I knew very young that Iowa State was the best school for me. Having Iowa State in my hometown was an added bonus. The campus is beautiful, and I am very at home here.

#### What created your interest in Physics?

My interest in Physics comes from a love of Astronomy. I am a bit 'star crazy'. I thoroughly enjoy getting up in the middle of the night to watch a meteor shower. This love led me to an interest in the way things work on Earth, as well as in the universe. It is very fun to me to learn why and how things work around me and to encourage others how much fun math and science can be.

#### What is your advice to incoming transfer students?

As an incoming transfer student, it is very important to get connected. Meet with an advisor and visit the Pathway2Stem website. The transition can be much easier if you plan ahead and have an instructor or advisor helping you along the way.

